

REMARKS/ARGUMENTS

Re-examination and favorable reconsideration in light of the following comments are respectfully requested.

Claims 1 - 14 are pending in the application. All claims currently stand rejected.

By the present amendment, claims 1, 5 - 11, 13, and 14 have been amended.

In the office action mailed October 9, 2008, claims 1 - 14 were rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement; claims 1 - 6 and 8 - 14 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,051,079 to Anderson; and claim 7 was rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson.

The foregoing rejections are traversed by the instant response.

Independent claim 1 is directed to an indenting tool comprising: a shank having a tip end; a diamond stone affixed to the tip end by a braze material, said diamond stone forming a point of the tool; and said diamond stone being mounted to said tip end within 8 degrees of a <17, 12, 24> direction.

Independent claim 13 is directed to an indenting tool comprising a shank having an end; a diamond stone secured to said end in a wear resistant orientation; and said wear resistant orientation being within 8 degrees if a <17, 12, 24> direction.

Independent claim 14 is directed to a method of making an indenting tool, comprising the steps of: providing a shank having an end; providing a diamond stone; positioning said diamond stone in a wear resistant orientation;

securing said diamond stone to said end; and said positioning step comprising positioning said diamond stone in a wear resistant orientation of within 8 degrees of a <17, 12, 24> direction.

With regard to the rejection of claims 1 - 14 under 35 U.S.C. 112, first paragraph, the Examiner has failed to set out a proper rejection. The Examiner has not provided any explanation as to why one of ordinary skill in the art could not make and use the invention without undue experimentation. See *In re Wands*, 858 F.2d 731, 736 - 737 (Fed. Cir. 1988). The Examiner has not provided any discussion of how the various *Wands* factors are being applied. For example, the Examiner makes no statement as to the quantity of experimentation would be necessary to make and use the claimed invention. Without a *Wands* analysis, the Examiner has failed to meet the Examiner's burden of making out an enablement rejection. Attached hereto is a declaration from Dr. Dilip M. Shah which states that one of ordinary skill in the art could make and use the invention without undue experimentation. As pointed out by Dr. Shah, it is clear from the detailed description that the present invention uses "a good quality single crystal diamond"[para. 0017], "stone" [para. 0018], and that the direction refers to a "crystallographic direction" [para. 0019]. Use of the words "single crystal", "crystallography" and "stereographic triangle" in the description makes it very clear to those using diamonds in the tool industry that the direction <17, 12, 24> are Miller indices which are very widely used in the mineral industry to describe the crystal orientation. The crystal orientation refers back to the atomic arrangement within

the crystal. Such a notation is not used to describe any kind of angles typically used to describe mechanical angles such as angle of the outer surface of the diamond tip with respect to the diamond tip's axis or the diamond's tip base. Such angles may be easily described on an engineering drawing.

The choice of the carrot bracket <...> is also intentional and conforms to well accepted practice in mineralogy, geology, metallurgy and material science in general. Determination of this direction is also not a trivial mechanical measurement exercise as it refers to atomic arrangement. The stated direction can accurately be determined by X-ray, neutron, electron, or other diffraction techniques which reflects the atomic arrangement. Selection of these agents is governed by the physics which requires that such agents have a wavelength approaching the atomic spacing within material and be energetic enough to penetrate the material.

In practice, the diamond stones are found naturally with crystal planes defined in varying degrees or can break along certain crystal planes called cleavage planes and the stated direction can be visually mapped as shown in the figure 1 attached to the Shah declaration, with reference to these planes. The diamond stones of suitable size then are mounted so that the desired location will be at the center and when the stone is subsequently ground to form a conical tip, the tip will be in the stated crystallographic direction.

Thus, with the use of the specific notation and the absence of any engineering drawing, one of ordinary skill in the art, familiar with the use of diamond tools, will be

able to make and use the claimed invention without any undue experimentation.

With respect to the Examiner's response to the Arguments, the notation $\langle 17, 12, 14 \rangle$ is a vector and the axes of reference to which this vector refers to are internal to the diamond crystal, not visible to the naked eye. As shown in Figure 2 attached to the Shah declaration, which is a perspective drawing depicting the arrangement of carbon atoms within a unit cube of diamond structure, the direction $\langle 17, 12, 24 \rangle$ means a vector direction obtained by going 17 cube edges along one of the cube edges starting from the origin, then going 12 cube edges along the second cube edge normal to the first one, and then going 24 cube edges along the third cube edge normal to the first two, and then joining the origin to the end point. The choice of the first, second and third cube edges is arbitrary as the atomic arrangement along all three is identical. Since these cube edges are not visible to the naked eye, one relies on diffraction techniques as discussed hereinbefore to determine how the tip of the diamond is oriented or in other words how the cube edges of the diamond crystal are oriented with respect to the tip.

Thus, the objection which has been raised by the examiner is not meaningful in this situation as x, y, and z do not refer to any visible features, In the context as shown in the sketch, within 8° means any vector within a 8° cone around the vector $\langle 17, 12, 24 \rangle$. Owing to the complexity of representing these ideas through a normal perspective drawing, this idea is best expressed using a stereographic projection. Those of ordinary skill in the art understand what is meant.

In conclusion, the rejection should be withdrawn since the basis for rejecting the claims is invalid. The direction and the angles for orientation of the diamond tip with respect to its base refer to its atomic arrangement and not any mechanical design angles.

With respect to the rejection of claims 1 - 6 and 8 - 14 on anticipation grounds over Anderson, the rejection fails for the following reasons. The Anderson patent pertains to "diamond coated cutting tools" and not a diamond stone or crystal. Indeed, the Anderson patent distinguishes itself over the prior art where a diamond stone or crystal are used. Thus, there is no commonality between the Anderson patent and the claimed invention. For this reason alone, Anderson does not anticipate the subject matter of claims 1, 13, and 14. Still further, there is no disclosure in Anderson et al. of the <17, 12, 24> direction. Moreover, as discussed before, the number in the <...> bracket is understood to be Miller indices and has a specific connotation which does not refer to any mechanical angles that can be described on an engineering drawing. It should also be noted that the Anderson patent is for diamond tools used in excavating industry, whereas the present invention is specifically directed at marking metal parts. The mechanical loading conditions in the two applications are sufficiently divorced that no one familiar with the application is likely to automatically consider "goodness" in one situation to be applicable to the other. The Anderson patent is intended for breaking hard materials, whereas the claimed invention is concerned with marking much softer ductile metals. The wear mechanisms in the two situations are expected to be very different and

experience in one area is not translatable to the other in any manner. Anderson would have no interest in using a diamond stone secured to an end of a shank in a wear resistant orientation, which wear resistant orientation is within 8 degrees of a <17, 12, 24> direction.

For these reasons, claims 1, 13, and 14 are not anticipated by Anderson.

Claims 2 - 6 and 8 - 12 are allowable for the same reasons as their parent claims, as well as on their own accord.

With regard to the rejection of claim 7 on obviousness grounds, the rejection fails because the Examiner provides no *Graham vs. John Deere* analysis and provides no line of technical reasoning having a rationale underpinning which would support the legal conclusion of obviousness. For example, the Examiner does not indicate why Anderson would want to use a synthetic diamond. The fact that something may be known in the prior art is insufficient to support the legal conclusion of obviousness.

With regard to the objection to the specification, the Examiner's position is in error. Paragraph [0019] clearly states that the diamond is inspected to determine the intrinsic crystallographic direction. It is understood that the direction refers to the axis of the diamond or the crystallographic direction of the diamond tip, which means that one is referring to the atomic arrangement. The problem is not with the specification, the problem is with the Examiner's understanding of same. On this point, it should be noted that the Examiner is not one of ordinary skill in the art.

For the foregoing reasons, the instant application is believed to be in condition for allowance. Such allowance is respectfully solicited.

Should the Examiner believe that an additional amendment is needed to place the case in condition for allowance, the Examiner is hereby invited to contact Applicant's attorney at the telephone number listed below.

The instant amendment should be entered since it does not raise any issue which requires further consideration and/or search on the part of the Examiner. Still further, the amendment raises no issue of new matter.

A request for a one-month extension of time is appended hereto. The Director is hereby authorized to charge said extension of time fee in the amount of \$130.00 to Deposit Account No. 02-0184.

Also appended hereto is a notice of appeal. The Director is hereby authorized to charge the notice of appeal fee of \$540.00 to Deposit Account No. 21-0279.

If the Director determines that an additional fee is due, he is hereby authorized to charge said fee to said Deposit Account No. 21-0279.

Respectfully submitted,
Reade Clemens

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Date: February 9, 2009

ATTACHMENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/718,086 Confirmation No. 9418
Applicant : Reade Clemens
Filed : November 19, 2003
TC/A.U. : 3724
Examiner : Phong H. Nguyen

Docket No. : EH-10546A (01-465A)
Customer No. : 34704

DECLARATION

I, DILIP SHAH, hereby declare that:

1. I am currently employed by United Technologies Corporation as a FELLOW in High Temperature Metals.
2. I have been employed by United Technologies Corporation for 31 years as a Materials Engineer and have been primarily involved in implementation of single crystal nickel base alloys.
3. I have a Ph.D. in Metallurgical Engineering.
4. I have worked in crystallographic technologies for 34 years.
5. I understand that claim 1, 13, and 14 are directed to the following subject matter:

Independent claim 1 is directed to an indenting tool comprising: a shank having a tip end; a diamond stone affixed to the tip end by a braze material, said diamond stone forming a point of the tool; and said diamond stone

being mounted to said tip end within 8 degrees of a <17, 12, 24> direction.

Independent claim 13 is directed to an indenting tool comprising a shank having an end; a diamond stone secured to said end in a wear resistant orientation; and said wear resistant orientation being within 8 degrees if a <17, 12, 24> direction.

Independent claim 14 is directed to a method of making an indenting tool, comprising the steps of: providing a shank having an end; providing a diamond stone; positioning said diamond stone in a wear resistant orientation; securing said diamond stone to said end; and said positioning step comprising positioning said diamond stone in a wear resistant orientation of within 8 degrees of a <17, 12, 24> direction.

6. I have read and understood the above-captioned patent application and the drawings. I have also read and understood the office action mailed October 9, 2008, and U.S. Patent No. 6,051,079 to Anderson et al. (hereinafter "Anderson").

7. I understand that all the claims in the application have been rejected under 35 U.S.C. 112, first paragraph as failing to comply with the enablement requirement and that claims 1 - 6 and 8 - 14 have been rejected under 35 U.S.C. 102(b) as being anticipated by Anderson.

8. I understand that the enablement requirement of 35 U.S.C. 112, first paragraph is satisfied when a patent application describes the invention so as to enable one of

ordinary skill in the art to make and use same without undue experimentation.

9. It is my conclusion that one of ordinary skill in the relevant field have the written description and the drawings before him/her can make and use the claimed invention without any undue experimentation and that the rejection made by the Examiner in the office action dated October 9, 2009 is erroneous for the following reasons. It is clear from the detailed description that the present invention uses "a good quality single crystal diamond"[para. 0017], "stone" [para. 0018], and that the direction refers to a "crystallographic direction" [para. 0019]. Use of the words "single crystal", "crystallography" and "stereographic triangle" in the description makes it very clear to those using diamonds in the tool industry that the direction <17, 12, 24> are Miller indices which are very widely used in the mineral industry to describe the crystal orientation. The crystal orientation refers back to the atomic arrangement within the crystal. Such a notation is not used to describe any kind of angles typically used to describe mechanical angles such as angle of the outer surface of the diamond tip with respect to the diamond tip's axis or the diamond's tip base. Such angles may be easily described on an engineering drawing.

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determined by X-ray, neutron, electron, or other diffraction techniques which reflects the atomic arrangement. Selection of these agents is governed by the physics which requires that such agents have a wavelength approaching the atomic spacing within material and be energetic enough to penetrate the material.

In practice, the diamond stones are found naturally with crystal planes defined in varying degrees or can break along certain crystal planes called cleavage planes and the stated direction can be visually mapped as shown in the attached figure 1, with reference to these planes. The diamond stones of suitable size then are mounted so that the desired location will be at the center and when the stone is subsequently ground to form a conical tip, the tip will be in the stated crystallographic direction.

Thus, with the use of the specific notation and the absence of any engineering drawing, one of ordinary skill in the art, familiar with the use of diamond tools, will be able to make and use the claimed invention without any undue experimentation.

With respect to the Examiner's response to the arguments in said office action, the notation $\langle 17, 12, 14 \rangle$ is a vector and the axes of reference to which this vector refers to are internal to the diamond crystal, not visible to the naked eye. As shown in the attached sketch in Figure 2, which is a perspective drawing depicting the arrangement of carbon atoms within a unit cube of diamond structure, the direction $\langle 17, 12, 24 \rangle$ means a vector direction obtained by going 17 cube edges along one of the cube edges starting from the origin, then going 12 cube edges along the second cube edge normal to the first one, and then going 24 cube edges along the third cube edge

normal to the first two, and then joining the origin to the end point. The choice of the first, second, and third cube edges is arbitrary as the atomic arrangement along all three is identical. Since these cube edges are not directly visible to the naked eye, one relies on diffraction techniques or the natural cleavage planes along which the diamond stone naturally break, as discussed hereinbefore to determine how the tip of the diamond is oriented or in other words how the cube edges of the diamond crystal are oriented with respect to the tip.

Thus, the objection which has been raised by the examiner is not meaningful in this situation as x, y, and z do not refer to any visible features. In the context as shown in the sketch, within 8° means any vector within a 8° cone around the vector <17, 12, 24>. Owing to the complexity of representing these ideas through a normal perspective drawing, this idea is best expressed using a stereographic projection. Those of ordinary skill in the art understand what is meant.

In conclusion, the rejection under 35 U.S.C. 112, first paragraph, should be withdrawn since the basis for rejecting the claims is invalid. The direction and the angles for orientation of the diamond tip with respect to its base refer to its atomic arrangement and not any mechanical design angles.

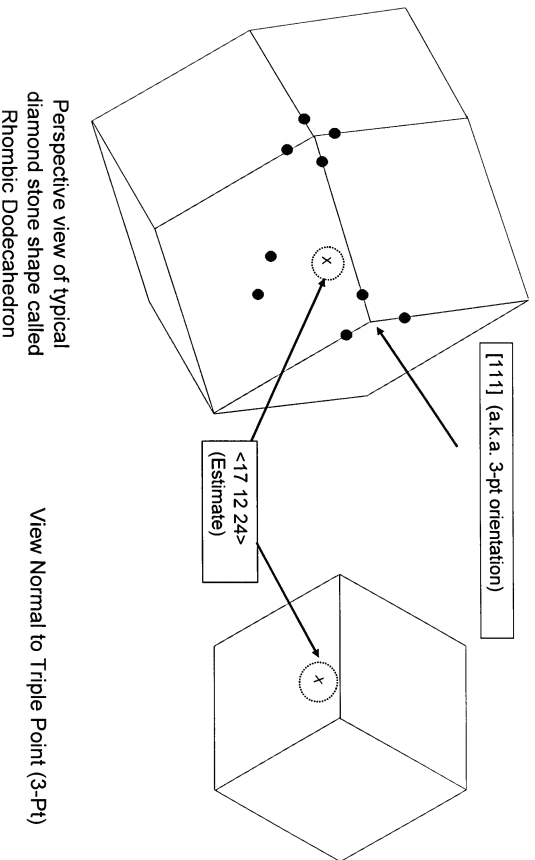
10. It is my understanding that a single prior art reference anticipates a claimed invention when all the limitations set forth in the claim(s) can be found expressly or inherently in that single prior art reference. With respect to the rejection of claims 1 - 6 and 8 - 14 on anticipation grounds over Anderson, the rejection fails for

the following reasons. The Anderson patent pertains to "diamond coated cutting tools" and not a diamond stone or crystal. Indeed, the Anderson patent distinguishes itself over the prior art where a diamond stone or crystal are used. Thus, there is no commonality between the Anderson patent and the claimed invention. For this reason alone, Anderson does not anticipate the subject matter of claims 1, 13, and 14. Still further, there is no disclosure in Anderson et al. of the claimed $\langle 17, 12, 24 \rangle$ direction. Moreover, as discussed before, the number in the $\langle \dots \rangle$ bracket is understood to be Miller indices and has a specific connotation which does not refer to any mechanical angles that can be described on an engineering drawing. It should also be noted that the Anderson patent is for diamond tools used in excavating industry, whereas the present invention is specifically directed at marking metal parts. The mechanical loading conditions in the two applications are sufficiently divorced that no one familiar with the application is likely to automatically consider "goodness" in one situation to be applicable to the other. The Anderson patent is intended for breaking hard materials, whereas the claimed invention is concerned with marking much softer ductile metals. The wear mechanisms in the two situations are expected to be very different and experience in one area is not translatable to the other in any manner. Anderson would have no interest in using a diamond stone secured to an end of a shank in a wear resistant orientation, which wear resistant orientation is within 8 degrees of a $\langle 17, 12, 24 \rangle$ direction.

The undersigned declares further that all statements made herein of their own knowledge are true and that all

statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Date: Feb. 9, 2009 *Dilip H. Shah*
DILIP SHAH



Perspective view of typical diamond stone shape called Rhombic Dodecahedron

View Normal to Triple Point (3-Pt)

Figure 1: Visual determination of desired 8° Range from $\langle 17\ 12\ 24 \rangle$ direction, with reference to cleavage planes or natural shape of diamond stone.

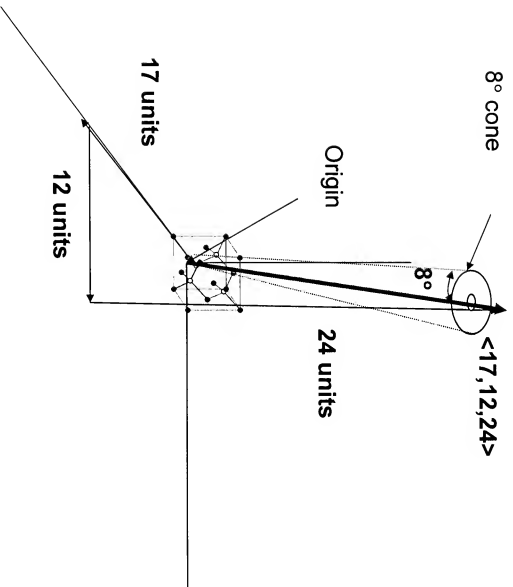


Figure 2: A perspective sketch showing the interpretation of $\langle 17, 12, 24 \rangle$ direction, with reference to atomic arrangement of carbon atoms within a single cell of diamond crystal.